INCIDENCE OF ANDROCHROMOTYPIC FEMALE *ISCHNURA RAMBURI* (ODONATA: COENAGRIONIDAE) IN THE HAWAIIAN ISLANDS[1]

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ABSTRACT: Of 549 female *Ischnura ramburi* collected (or observed) from 17 localities on the islands of Hawaii and Oahu in the state of Hawaii, only 3 androchromotypic females were seen. These occupied a small pond on the University of Hawaii (Manoa) campus. *I. ramburi* is not native to Hawaii and the results suggest more than one introduction, perhaps via discarded aquarium contents.

Ischnura ramburi Selys-Longchamps is a North American damselfly (Davies and Tobin, 1984) first collected from Hawaii in 1973 by Harwood (1976). He recorded it at three localities on the island of Hawaii and at two on Oahu. Harwood states of *I. ramburi:* "habits are such that impregnated females may seek shelter in aircraft" and suggested that this may have been the species' mode of entry into the Hawaiian Islands. Since *I. ramburi* occurred on two widely separated islands at the time of Harwood's collections (Feb. 21-Mar. 21 in both 1973 & 1974), he did not consider it possible "to state with assurance where the species first became established". It is also possible that *I. ramburi* could have been introduced into the Hawaiian Islands via eggs or larvae associated with aquatic vegetation accompanying imported tropical fishes for the home aquarium market. The fact that tropical fishes, with their aquarium vegetation, are sometimes released into external environments has been documented by McAllister (1969) and Pritchard (1971) for the exotic flora and fauna inhabiting hot spring outflows in the Canadian Rocky Mountains near Banff, Alberta.

Robertson (1986) reported collecting *I. ramburi* on the islands of Hawaii, Kauai and Oahu. He "collected large series" (numbers not stated), though only from one locality on each of Kauai and Oahu and two localities on Hawaii, without obtaining any "andromorph" (=androchromotypic*) females. He implied that such female polymorphisms might not occur on islands.

I spent one year (July 1, 1985-June 30, 1986) collecting Odonata at various localities throughout Oahu. My collections and observations of *I. ramburi* contain information that directly relates to some of Robertson's (1985, 1986) ideas.

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METHODS

Ischnura ramburi females were either: a) collected by netting, soaked in acetone for 24 hrs and then stored in clear cellophane envelopes, or b) individuals engaged in various reproductive activities were closely observed among emergent vegetation. In addition, I examined all specimens at the University of Hawaii (Manoa campus) and the B.P. Bishop Museum.

RESULTS

I collected 168 female *I. ramburi* from the following Oahu loalities: Kawainui Swamp near Kailua (a total of 10 collected over four occasions during July 29-Sept. 25, 1985); Salt Lake (a total of 52 collected over six occasions during Jan. 10-Mar. 3, 1986); University of Hawaii, Manoa campus (a total of 43 collected over nine occasions during Oct. 30, 1985-Jan. 7, 1986); Waimanolo (a total of 63 collected over 20 occasions during Oct. 25, 1985-Jan. 21, 1986). I also closely observed reproductive behaviors of 296 solitary females and 65 tandem pairs at Salt Lake over 13 occasions during Jan. 10-Mar. 12, 1986. In addition, there were 10 females from six different Oahu localities in the University of Hawaii collection, and another 10 females from four Oahu and two Hawaii sites in the B.P. Bishop Museum. A total of 549 females were thus examined, all but three of which were gynochromotypic*. The only locality where androchromotypic females occurred was a small pond adjacent to the tennis courts on the University of Hawaii (Manoa) campus where three of 43 (7.0%) were androchromotypic.

DISCUSSION

Obviously androchromotypic females of *I. ramburi* do occur in Hawaii, although so far detected at only one site. This suggests that there may have been more than one introduction of *I. ramburi* into the islands since the androchromotypic trait is not widespread, as it would have to be if *I. ramburi* dispersed over the islands from an initial entry point. Furthermore, the presence of the androchromotypic population at the Manoa campus pond strongly points to its source being discarded aquarium contents. This is particularly likely with the thousands of college students occupying dormitories nearby. Many undoubtedly keep pets which might be disposed of when the academic year ends and students vacate their residence rooms. This seems a more likely scenario than an introduction by aircraft since the Honolulu airport is many miles away from

the Manoa campus site and yet there are populations of *I. ramburi* (e.g. Salt Lake) much closer to the airport, but in these the females are all gynochromotypic.

After I detected androchromotypic females at the Manoa campus, I initiated a study of this population. During the brief time I had to observe living individuals, 2/17 (11.8%) solitary females were androchromotypic and 1/9 (11.1%) tandem pairs contained an androchromotypic female. Although these data are very small, they do not indicate that androchromotypic females are any less likely than gynochromotypic ones to be grasped in tandem by males. Such results are at variance with Robertson's (1985) more extensive data obtained from a population of *I. ramburi* near Lake Placid, Florida, in which 31.1% (28/90) of the females were androchromotypic. He presented data which showed that copulations involving androchromotypic females occurred about half as often (17.1% (28/164)) as would be expected based upon the proportion of androchromotypic to "heteromorph" (=gynochromotypic) females in the population, apparently because males do not readily recognize the former as females. He suggested that this gave androchromotypic females an advantage in that they didn't have to waste time on unnecessary multiple matings and, since they spent less time mating, were not as likely to be seen by predators.

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